

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Reimer, et al.

Serial No.: 09/220,153

Confirmation No.: Unknown

Filed: December 23, 1998

**For: Processing Apparatus Having
Integrated Pumping System**

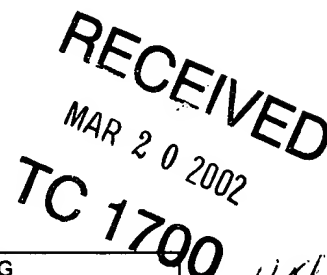
Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

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**Group Art Unit: 1763**

Examiner: R. Bueker



**CERTIFICATE OF MAILING**  
**37 CFR 1.8**

I hereby certify that this correspondence is being deposited on 28 Feb 2002 with the United States Postal Service as First Class Mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231.

28 Feb 2002      Walter R. Pittman  
Date                      Signature

### DECLARATION UNDER 37 C.F.R. 1.132

**I hereby declare that:**

1. I am an inventor of the above-identified patent application and an employee of Applied Materials, Inc., the assignee of the present patent application.
2. I have a Master of Science in Mechanical Engineering from the University of Minnesota, and a Bachelor of Science in Mechanical Engineering from the University of Tehran. I have worked in the field of substrate processing for 9 years. I am currently an Engineering Manager at Applied Materials, Inc.
3. I have read the references cited by the Examiner in the pending application including U.S. Patent No. 5,709,753 to Olson et al. (hereinafter *Olson*); and U.S. Patent No. 5,904,952 to Lopata et al. (hereinafter *Lopata*).
4. *Olson* teaches a pump with a pumping capacity that is incapable of rapidly evacuating gas from a chamber as is required with the substrate processing apparatus

described in the present application. *Olson* specifies that the pump used is a "Drytel Series dry pump manufactured by Alcatel, Inc." Attached as Exhibit I is a description of these pumps with their operating characteristics provided by the manufacturer. Using the information provided and assuming the pump is used to evacuate a load-lock chamber having a volume of 30 liters, the pump of *Olson* would require at least 3 minutes to pump down the chamber to a pressure of 100mT. The pump of the present invention on the other hand, because of its superior operating characteristics, can pump down the same chamber to the same pressure in as little as 15 seconds. As discussed in the application (page 9, lines 6-8), a load-lock chamber must be evacuated each time a new batch of substrates is placed in or removed from the chamber. This rapid, repeated pump down for a high throughput system like the one described in the application could not be achieved with the pump of *Olson* and there would be no motivation to use the pump of *Olson* in a high throughput setting.

5. In addition to the foregoing, the pump of *Olson* is not really a dry pump but is a combination of a diaphragm pump and a molecular drag pump that does not exhaust gas to atmospheric pressure.

6. *Lopata* teaches a substrate processing apparatus using diffusion pumps and mechanical pumps. While the mechanical pumps are shown near the apparatus in the Figures of the patent, there is absolutely no description of the pumps or of their location in the patent document. The description does make it clear that the process is a CVD process and requires a pump capable of providing high flow rates. Absent some teaching to locate these pumps close to the chamber, design and engineering practice suggests the pumps be located remotely from the chamber as these prior art pumps are too large and noisy to be located near a processing apparatus.

As the person signing below, I hereby declare that all statement made herein are of my own knowledge and are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or

imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of inventor: Pedram Sabouri

Inventor's signature:

Pedram Sabouri

Date:

2,27,02

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San Jose, CA 95118

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# HIGH VACUUM PUMPS



► Compact dry  
pumping systems

DRYTEL series

EXHIBIT

tabbies

High Vacuum Pumps

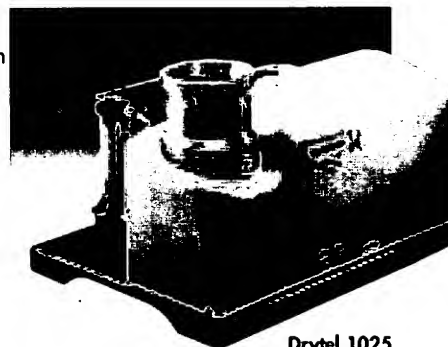
### Dry pumping unit

Drytel units are dry pumping systems including an Alcatel molecular drag pump (MDP) and an oil-free forepump. Designed to be used as bench top or easily integrated in a system, these units provide a dry clean vacuum from atmosphere to  $10^{-6}$  mbar/Torr.

#### Small pumping configuration: Drytel 1025

p 4 à 7

Based on the new "Open Concept", this unique, small and robust pumping system provides a suitable solution for backing turbomolecular pumps or pumping a system down to  $10^{-6}$  mbar/Torr. The Drytel 1025 accommodates a 7.5 l/s drag pump and a 1 m<sup>3</sup>/h diaphragm pump in a compact design.



Drytel 1025

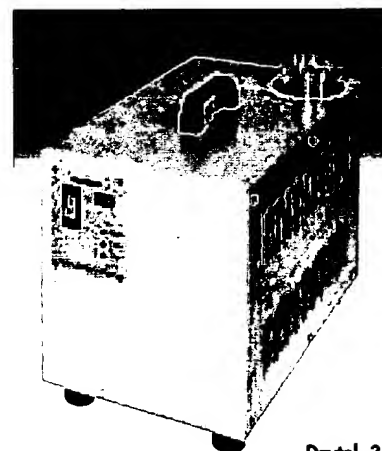
#### Large pumping configuration: Drytel 34 / Drytel 100

p 8 à 11

Already used on numerous types of systems, these units are suitable for all applications which require a fast pumpdown time.

The Drytel 34 accommodates a 7.5 l/s drag pump and a 4 m<sup>3</sup>/h diaphragm pump.

The Drytel 100 accommodates a 24 l/s drag pump and a 4 m<sup>3</sup>/h diaphragm pump.



Drytel 34

### Applications


Drytel series is recommended for all applications where a dry clean vacuum is required such as in industries (semiconductor, analytical instrumentation, pharmaceutical, chemicals, ...) and in Research and Development laboratories.

They can be used in various types of applications:

- Backing of turbomolecular pump
- Loadlock pumping
- Mass spectrometry
- Surface analysis
- Ion pump evacuation
- Cryopump regeneration
- Calibration bench
- ...

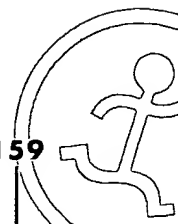
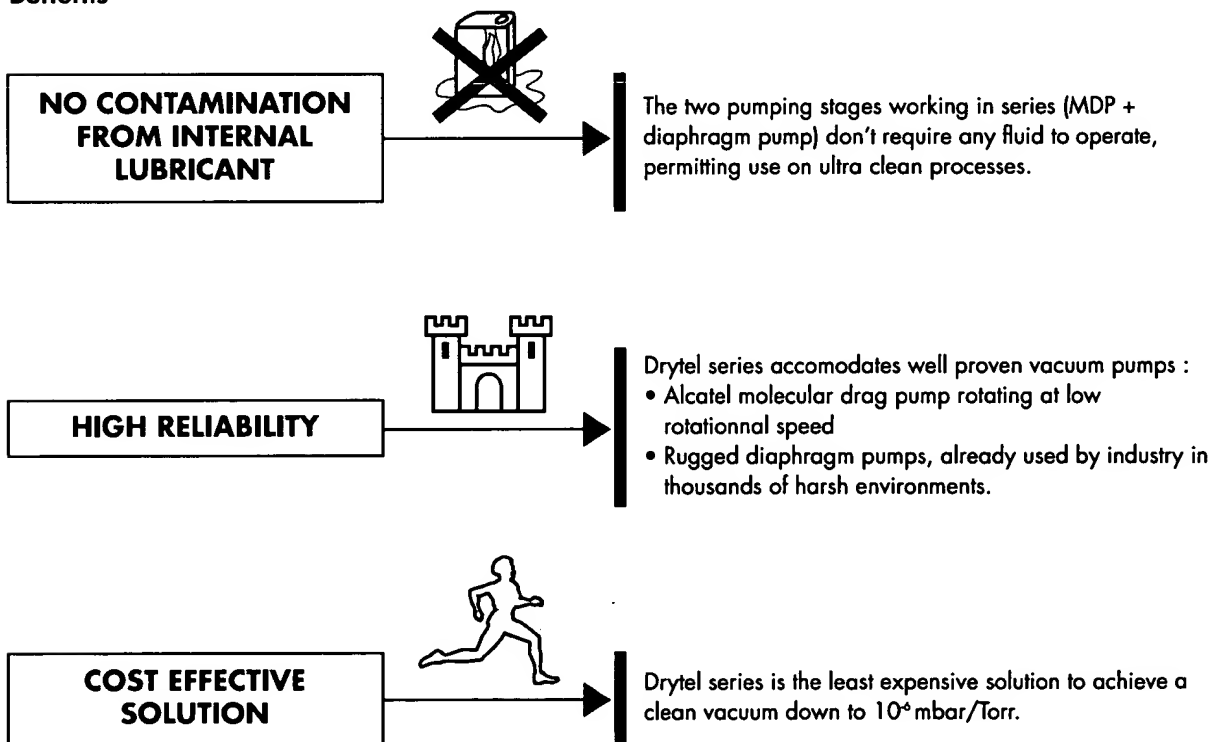
## Drytel series

**"Open Concept" : a new generation of Alcatel's turbo pumping group...**

|                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <ul style="list-style-type: none"> <li>• <b>OPEN Design</b></li> <li>• <b>OPEN Configuration</b></li> <li>• <b>OPEN Applications</b></li> </ul> | <p><b>Main advantages of the "Open Concept"</b></p> <ul style="list-style-type: none"> <li>• <b>Flexible</b><br/>possibility to get the most adapted configuration</li> <li>• <b>Compact</b></li> <li>• <b>Easy to maintain</b><br/>direct access to the main components</li> <li>• <b>Cost effective</b></li> </ul> <p>As a part of the "Open Concept" family, the Drytel 1025 has been designed to offer various configurations.<br/>Please consult your Alcatel's representative for more information on the available configurations.</p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

High Vacuum Pumps

### Benefits



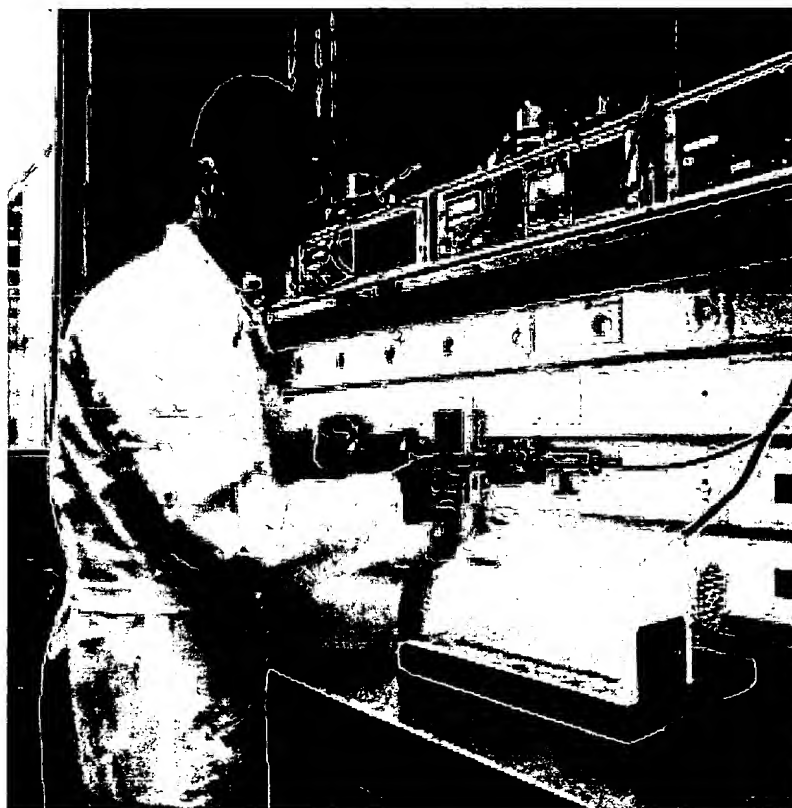
## Drytel series

### Small pumping configuration: Drytel 1025

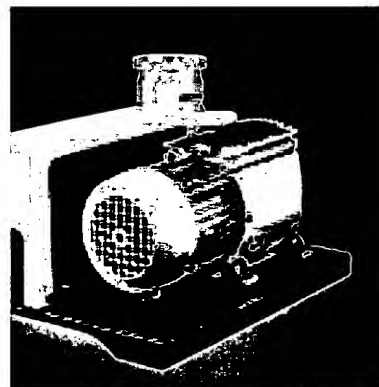
The Drytel 1025 is the first member of a new family based on the "Open Concept".

The Drytel 1025 is a new, small and robust pumping system which provides a suitable solution for backing turbomolecular pumps or pumping a system down to  $10^{-6}$  mbar/Torr.

It accommodates a 7.5 l/s drag pump and a 1.5 m<sup>3</sup>/h diaphragm pump in a compact design.



MDP 5011 (7.5 l/s)  
integrated on the Drytel 1025

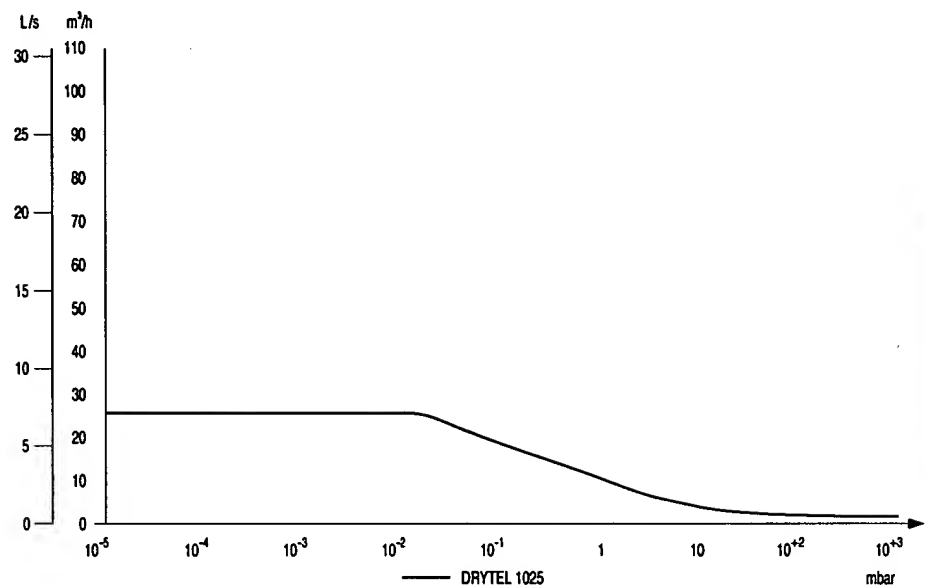


New 1.5 m<sup>3</sup>/h diaphragm pump

Drytel series

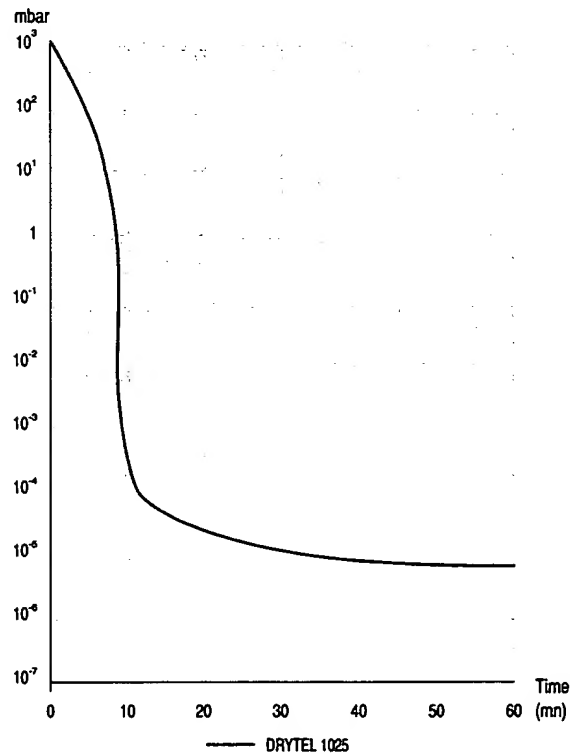
Technical data

Pumping speed / Inlet pressure (N<sub>2</sub>)



HIGH VACUUM PUMPS

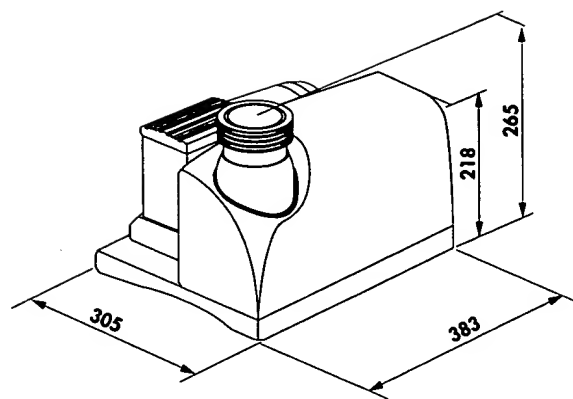
Pump down curves  
on a 30 l volume of N<sub>2</sub>



### Technical data

| Characteristics                           |                | Drytel 1025       |                  |
|-------------------------------------------|----------------|-------------------|------------------|
| Ultimate pressure*                        |                | mbar              | 10 <sup>-4</sup> |
| Pumping speed<br>< 10 <sup>-2</sup> mbar* | N <sub>2</sub> | l/s               | 7.5              |
|                                           | He             | l/s               | 4                |
|                                           | H <sub>2</sub> | l/s               | 3                |
| Primary module pumping speed              |                | m <sup>3</sup> /h | 1                |
| Exhaust pressure                          |                | mbar              | Atmosphere       |
| Start-up time                             |                | min               | 2 min            |
| Cooling system                            |                |                   | Air              |
| Maximum inlet pressure                    |                | mbar              | 5                |
| Maximum ambient temperature               |                | °C                | 0 to 35          |
| Maximum power consumption                 |                | VA                | 250              |
| Inlet flange                              |                |                   | DN 63 ISO-K      |
| Weight                                    |                | kg (lb)           | 15 (33)          |

\* Pneurop measurement



Dimensions in mm

### Options and accessories

#### Options

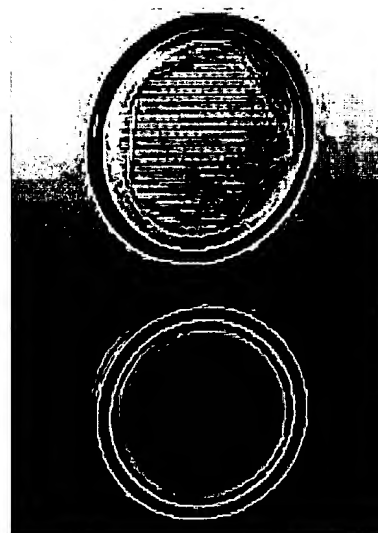
It is possible to fit the Drytel 1025 with several types of options:

- Interface board: allows the remote operation of the Drytel (start/stop and monitoring of the pumping system status),
- Automatic gas ballast: improves the pumping of light gases and reduces the condensation inside the Drytel,
- Exhaust connection: allows the collection of pumped gases to prevent their release to the atmosphere.

#### Accessories

Various accessories dedicated to the molecular drag pump can be offered as options. In particular, the inlet screen can be used to prevent foreign material to enter the pump.

| Description                                                            | P/N    |
|------------------------------------------------------------------------|--------|
| Inlet screen (DN 63) - 2.5 mm mesh                                     | 063117 |
| Inlet dust filter 20 µ (DN 63)                                         | 062912 |
| Aluminium centering ring (DN 63) special for MDP 5011 (without o-Ring) | 063212 |



Standard & dense mesh inlet screen

# Drytel series

## Ordering information

|      |   |   |  |  |  |  |  |   |
|------|---|---|--|--|--|--|--|---|
| D025 | A | S |  |  |  |  |  | 0 |
|------|---|---|--|--|--|--|--|---|

|      |             |  |
|------|-------------|--|
|      | Drytel 1025 |  |
| Code | D025        |  |

|      |             |    |
|------|-------------|----|
|      | Gas Ballast |    |
|      | Yes         | No |
| Code | L           | N  |

|      |                 |    |
|------|-----------------|----|
|      | Interface board |    |
|      | Yes             | No |
| Code | P               | N  |

|      |          |       |
|------|----------|-------|
|      | Exhaust  |       |
|      | Standard | DN 16 |
| Code | S        | D     |

|      |                      |                      |
|------|----------------------|----------------------|
|      | Tension              |                      |
|      | 110/130 V - 50/60 Hz | 200/240 V - 50/60 Hz |
| Code | 7                    | 8                    |

|      |            |                |      |       |             |
|------|------------|----------------|------|-------|-------------|
|      | Cable Type |                |      |       |             |
|      | U.S.A.     | France/Germany | U.K. | Italy | Switzerland |
| Code | 1          | 2              | 3    | 4     | 5           |

High Vacuum Pumps

For example  
You need ...

|                      |      |  |
|----------------------|------|--|
| Drytel               | D025 |  |
| Gas ballast          | L    |  |
| Interface board      | P    |  |
| Exhaust DN 16        | D    |  |
| 110/130 V - 50/60 Hz | 7    |  |
| U.S.A.               | 1    |  |

=

|      |   |   |   |   |   |   |   |   |
|------|---|---|---|---|---|---|---|---|
| D025 | A | S | L | P | D | 7 | 1 | 0 |
|------|---|---|---|---|---|---|---|---|

### Large pumping configuration: Drytel 34 - Drytel 100

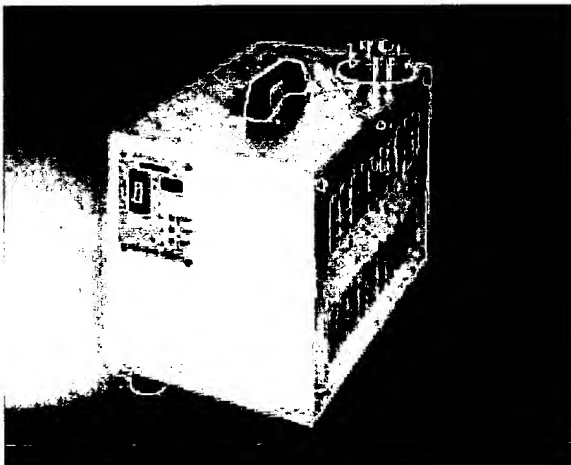
The Drytel 34 and the Drytel 100 provide large configurations for pumping down to  $10^{-6}$  mbar/Torr at high pumping speed.

They accommodate a 4 m<sup>3</sup>/h diaphragm pump and an associated molecular drag pump (MDP), according to the requested configuration.

Specific versions are available for corrosive applications ("C" version equipped with a MDP chemical version).

HIGH VACUUM PUMPS

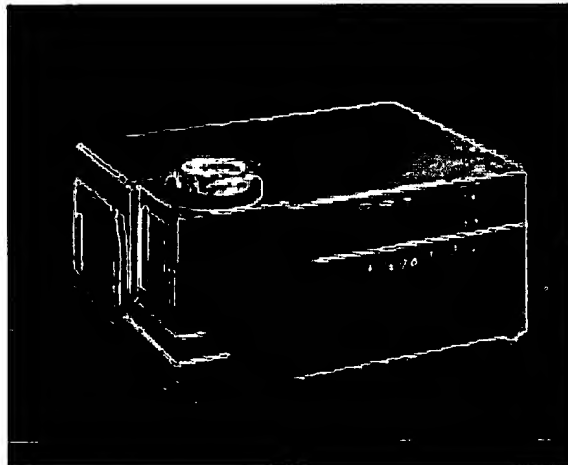
#### Drytel 34



Drytel 34 equipped with a 7.5 l/s drag pump

450 l/min

#### Drytel 100



Drytel 100 equipped with a 27 l/s drag pump "C" version

1620 l/min

### Technical data

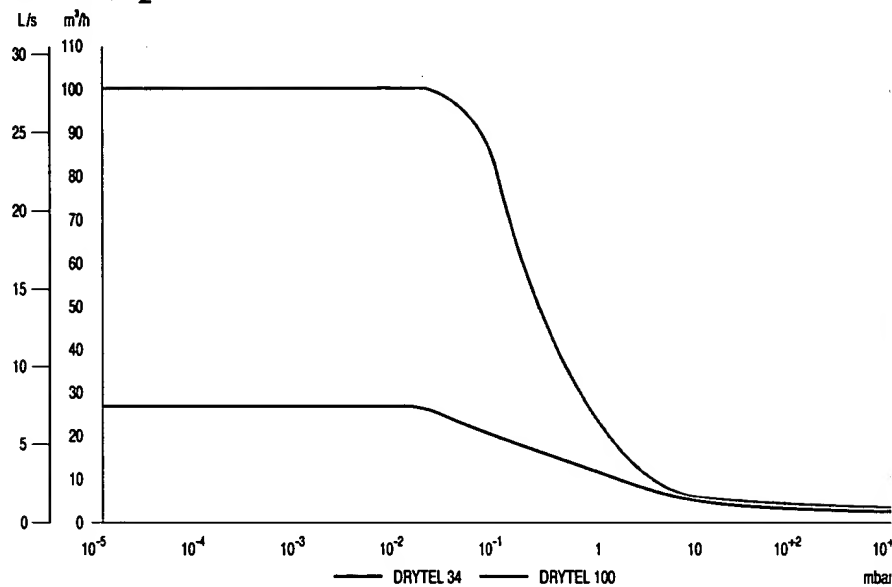
| Characteristics                    |                   |     | Drytel 34/34 C    | Drytel 100/100 C  |
|------------------------------------|-------------------|-----|-------------------|-------------------|
| Ultimate pressure*                 | mbar              |     | $10^{-6}/10^{-5}$ | $10^{-6}$         |
| Pumping speed<br>< $10^{-2}$ mbar* | N <sub>2</sub>    | l/s | 7.5               | 27                |
|                                    | He                | l/s | 4                 | 18                |
|                                    | H <sub>2</sub>    | l/s | 3                 | 15                |
| Primary module pumping speed       | m <sup>3</sup> /h |     | 4                 | 4                 |
| Exhaust pressure                   | atm               |     | ( $10^3$ mbar)    | ( $10^3$ mbar)    |
| Start-up time                      | min               |     | 2 min             | 1.5 min           |
| Cooling system                     |                   |     | Air   Water       | Air   Water       |
| Maximum inlet pressure             | mbar              |     | 5                 | 5   10            |
| Maximum ambient temperature        | °C                |     | 0 to 35   0 to 50 | 0 to 35   0 to 45 |
| Maximum power consumption          | VA                |     | 575               | 650               |
| Inlet flange                       |                   |     | DN 63 ISO-K       | DN 100 ISO-K      |
| Weight                             | kg (lb)           |     | 36 (80)           | 43 (95)           |

\* Pneurop measurement

Drytel series

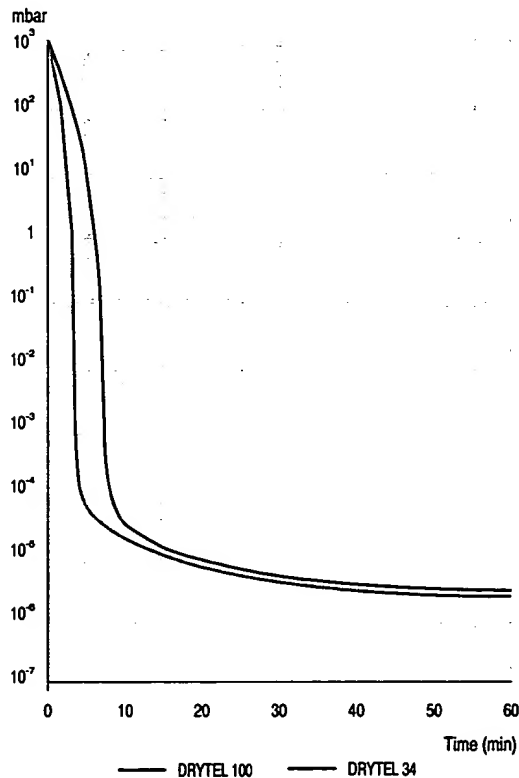
Technical data

Pumping speed / Inlet pressure (N<sub>2</sub>)



High Vacuum Pumps

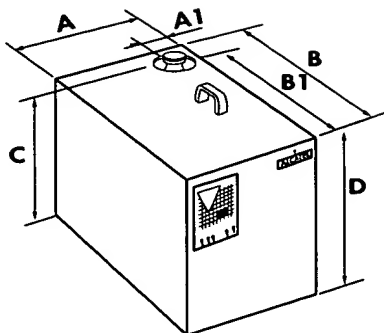
Pump down curves  
on a 30 l volume of N<sub>2</sub>



# Compact Dry Pumping Systems

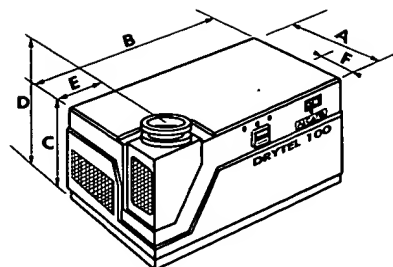
## Drytel series

### Dimensions



Drytel 34

| Model       | A   | A1 | B   | B1  | C   | D   |
|-------------|-----|----|-----|-----|-----|-----|
| Drytel 34   | 280 | 65 | 450 | 387 | 375 | 345 |
| Drytel 34 C | 280 | 65 | 450 | 387 | 375 | 345 |



Drytel 100

| Model        | A   | B   | C   | D   | E  | F  |
|--------------|-----|-----|-----|-----|----|----|
| Drytel 100   | 465 | 625 | 305 | 350 | 99 | 93 |
| Drytel 100 C | 465 | 625 | 305 | 350 | 99 | 93 |

### Ordering information

| Model        | Flange       | Cooling | Single phase          |                |                   |                   |
|--------------|--------------|---------|-----------------------|----------------|-------------------|-------------------|
|              |              |         | PART NUMBER           |                |                   |                   |
|              |              |         | 230 V (*)<br>50/60 HZ | 115 V<br>60 HZ | 100 V<br>50/60 HZ | 200 V<br>50/60 HZ |
| Drytel 34    | DN 63 ISO-K  | Air     | 798619                | 798619         | 798622            | 798625            |
| Drytel 100   | DN 100 ISO-K | Air     | 795453                | 795454         | 795455            | 795457            |
|              |              | Water   | 795540                | 795541         | 795542            | 795544            |
| Drytel 34 C  | DN 63 ISO-K  | Air     | 798614                | 798620         | 798623            | 798626            |
| Drytel 100 C | DN 100 ISO-K | Air     | 795909                | 795910         | 795911            | 795913            |
|              |              | Water   | 795918                | 795914         | 795915            | 795917            |

#### Optional Power Cords

| Description                        | P/N    |
|------------------------------------|--------|
| US power cord<br>for 230 V - 60 Hz | 107404 |
| US power cord<br>for 230 V - 50 Hz | 107405 |

(\*) Delivered with European power cord, for other power cords see below

#### Note

The Drytel 34 and the Drytel 100 can be customer specified with additional accessories.



### Options and accessories

The Drytel 34 and Drytel 100 can be specified with a comprehensive range of additional accessories to meet customer requirements. Options are factory installed: they must be specified when ordering the Drytel. Accessories can be ordered separately.

#### Improving the performance:

- The manual or electrical (automatic) gas ballast improves the pumping of light gases, or reduces condensation inside the Drytel.
- The standard of dense mesh inlet screen should be used to prevent foreign material to enter the high vacuum pump.

#### Integration in a system:

- The exhaust connection collects the pumped gases to prevent their release to the atmosphere. If the gases are corrosive, a "C" type exhaust connection is appropriate.
- A separator kit may be used to separate the high vacuum pump from the Drytel.

#### Control:

The interface kits allow a remote operation of the Drytel (start/stop and monitoring of the pumping system status).

#### Others:

In any case, please contact us directly if your specific need is not covered by a standard product. We offer product customization and integration of accessories such as valves, gauges, etc...

#### Drytel 100/Drytel 100 C Options

| Description                                                                      | Drytel |       | PART NUMBER |
|----------------------------------------------------------------------------------|--------|-------|-------------|
|                                                                                  | 100    | 100 C |             |
| Manual gas ballast valve between MDP and dry primary pump (light gases pumping)  | •      | •     | 050590      |
| Electrical gas ballast valve 24 VDC (other voltages on request)                  | •      | •     | 050580      |
| Exhaust connection (DN 16)                                                       | •      |       | 050554      |
| "C" type inert gas purge connector (DN 16 ISO-KF) and exhaust connection (DN 16) | •      |       | 062979      |
| "C" type exhaust flange extension - Stainless steel / teflon                     |        | •     | 050577      |
| Interface control                                                                | •      | •     | 062898      |
| Set of 4 casters                                                                 | •      | •     | 062868      |

#### Drytel 100/Drytel 100 C Accessories

| Description                         | Drytel 100/100 C | PART NUMBER |
|-------------------------------------|------------------|-------------|
|                                     |                  |             |
| Set of 4 handles                    | •                | 050590      |
| Inlet screen (DN 100) - 2.5 mm mesh | •                | 050580      |
| Inlet dust filter 20 µ (DN 100)     | •                | 050554      |

#### Drytel 34/Drytel 34 C Accessories

| Description                                                       | Drytel 34/34 C | PART NUMBER |
|-------------------------------------------------------------------|----------------|-------------|
|                                                                   |                |             |
| Side (horizontal) inlet kit for MDP                               | •              | 050591      |
| Air cooling flow deflector                                        | •              | 050587      |
| Inlet screen (DN 63) - 2.5 mm mesh                                | •              | 063117      |
| Inlet dust filter 20 µ (DN 63)                                    | •              | 062912      |
| Aluminium centering ring (DN 63) special for MDP (without o-ring) | •              | 063212      |